



Hypertensive retinopathy in a cat

Sherry A. Van Boxtel

Abstract — A 12-year-old cat presented for sudden blindness was diagnosed with hypertensive retinopathy on the basis of ophthalmologic and ultrasonic examination. Renal failure due to a large intranephric cyst obstructing the right ureter and renal artery was the suggested cause of the systemic hypertension. The cat died 8 hours after unilateral nephrectomy.

Résumé — **Rétinopathie hypertensive chez un chat.** Suite à des examens ophtalmologiques et par ultrasons, un diagnostic de rétinopathie hypertensive a été posé chez un chat de 12 ans présenté pour cécité soudaine. Une défaillance rénale reliée à un gros kyste intrarénal obstruant l'uretère droit et l'artère rénale semble être la cause de l'hypertension systémique. Le chat est mort 8 heures après la néphrectomie unilatérale.

(Traduit par Docteur André Blouin)

Can Vet J 2003;44:147-149

A 12-year-old, neutered male, domestic shorthair was presented for sudden onset of blindness (day 1). The owner reported that the cat had been bumping into stationary objects, had become lethargic, had lost weight, and was vomiting frothy bile. There was no history of trauma or exposure to toxic agents. Prior history included recurrent cystitis and chronic renal failure; tests for feline leukemia virus (FeLV), feline immunodeficiency virus (FIV), and feline infectious peritonitis (FIP) had been negative.

On physical examination, the cat was tachycardic (280 beats/min); however, respiratory sounds and rectal temperature were normal and no heart murmur could be auscultated. Mucous membranes were moist and pink, and capillary refill time was < 2 s. Deep abdominal palpation revealed a large firm mass in the cranial part of the abdomen. Survey lateral and dorsoventral radiographs of the abdomen and thorax confirmed the presence of an enlarged right kidney, approximately 4 cm wide by 6 cm long, which displaced the intestine to the left side of the abdomen. Half to three quarters of the kidney was occupied by a radiolucent, fluid-like structure. The liver was slightly enlarged, and bronchial disease was evident in the lungs. Other organs appeared radiographically normal. Examination of the eyes with a direct ophthalmoscope revealed dilated pupils, absent direct and consensual pupillary light reflexes, retinal hemorrhages, arterial tortuosity, and bullous retinal detachment. The

menace response was absent bilaterally. The degree of detachment and tortuosity of vessels was more severe in the left eye than in the right. Blindness was attributed to bilateral retinal detachment.

A complete blood cell (CBC) count, serum biochemical profile, urinalysis, and serum T4 evaluation (Vitatch Laboratories, Mississauga, Ontario) were performed. There was mild anemia, with circulating reticulocytes accounting for 0.1% of erythrocytes (reference range, 0.4% to 1.4%). The red blood cell count was within the normal range at 7.2×10^{12} cells/L. The serum biochemical profile indicated renal insufficiency. Abnormal biochemical parameters included blood urea nitrogen (14 mmol/L; reference range, 4.0 to 10.7 mmol/L), creatine (200 mmol/L; reference range, 50 to 177 mmol/L), creatinine kinase (2788 U/L; reference range, 15 to 295 U/L), and amylase (3185 U/L; reference range, 10 to 2935 U/L). Serum sodium (156 mmol/L; reference range, 145 to 155 mmol/L) and chloride (127 mmol/L; reference range, 101 to 125 mmol/L) were both slightly increased, while serum potassium was low (3.4 mmol/L; reference range, 4 to 5.8 mmol/L). All other parameters were within normal limits. A free-flow urine sample had a specific gravity of 1.048 (reference range, 1.035 to 1.065) and a urine protein content of 1 g/L (reference range, 0 to 0.1 g/L). Serum T4 was within the normal reference range.

On the basis of the physical examination and preliminary diagnostic test results, a tentative diagnosis of hypertensive retinopathy was made. Although possible etiologies included chronic renal failure, chronic anemia, hyperthyroidism, hyperadrenocorticism, diabetes mellitus, acromegaly, polycythemia, and pheochromocytoma, chronic renal failure was considered the most likely cause in this case.

Abdominal and ophthalmic ultrasonographs were taken on day 8. The cat was sedated with butorphanol (Torbugesic; Ayerst, Guelph, Ontario), 0.7 mg/kg

Ontario Veterinary College, University of Guelph, Guelph, Ontario N1G 2W1.

Address all correspondence and reprint requests to Dr. Van Boxtel.

Dr. Van Boxtel's current address is Martin Veterinary Hospital, 5460 Dundas Street West, Etobicoke, Ontario M9B 1B4.

Dr. Van Boxtel will receive 50 free reprints of her article, courtesy of *The Canadian Veterinary Journal*.

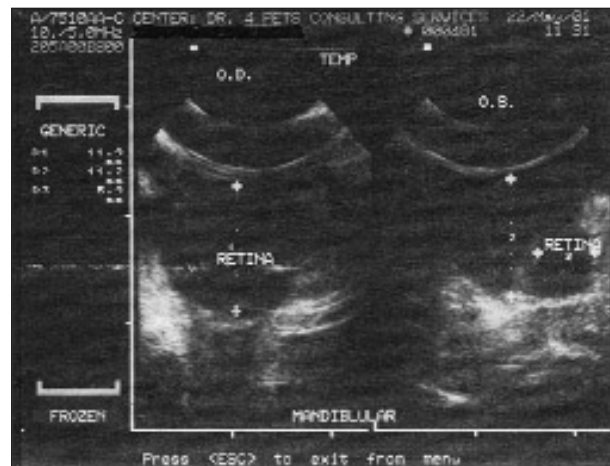
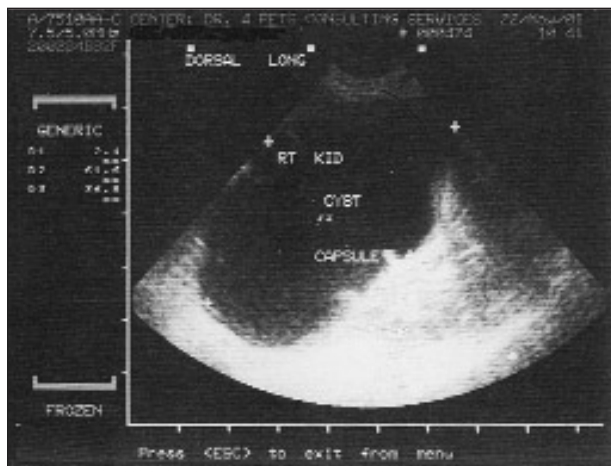


Figure 1. Abdominal (left) and ophthalmic (right) ultrasonograms of a 12-year-old cat with a palpable abdominal mass and sudden onset blindness with a presumptive diagnosis of hypertensive retinopathy. Ultrasonography was performed using a 7.5-mHz probe for the abdominal examination and a 10.0-mHz probe for the ophthalmic examination (Biosound 3000; Biosound Esaote Inc., Indianapolis, Indiana, USA). Note the 61.6×31.8 -mm intraneuphric cyst involving the right kidney. The cyst appears to occupy most of the functional renal mass. Note that the left retina is detached by 5.9 mm and the right retina is detached by 2.3 mm.

bodyweight (BW), SC, for abdominal ultrasonography (Biosound 3000; Biosound Esaote, Indianapolis, Indiana, USA) with a 7.5 mHz probe. A 61.6×36.8 -mm intraneuphric cyst of the right kidney, surrounded by 2.4 mm of intact kidney capsule, was identified (Figure 1). This single hypoechoic cyst occupied most of the kidney, dilating all but 16.4 mm of the capsule on the caudal aspect of the kidney. The cyst appeared to partially or completely obstruct the right ureter and associated vessels. The left kidney appeared normal in architecture, structure, and size (36.6×26.6 mm). All other abdominal organs appeared normal. The adrenal glands were not observed. Differential diagnoses for the enlarged kidney included intraneuphric cyst, perineuphric cyst, or renal abscess.

Ultrasonic examination of both eyes, using a 10.0 mHz probe, confirmed the diagnosis of bilateral retinal detachment. A 5.9-mm detachment of the left retina and a 2.3-mm detachment of the right retina were recorded (Figure 1). Both globes appeared normal in size and there was no evidence of intra- or extraocular masses. A systemic blood pressure reading of 244 mmHg was determined over the left palmar metacarpal area by using the indirect Doppler method (Ultrasound Flow Detector 811-B; Parks Medical Electronics, Aloha, Oregon, USA). These findings were consistent with hypertensive retinopathy in conjunction with right ureter occlusion by an intraneuphric cyst.

Unilateral nephrectomy was performed on day 9. The cat was premedicated with butorphanol, 0.4 mg/kg BW, SC, and acepromazine (Atravet Injectable; Ayerst, Guelph, Ontario), 0.1 mg/kg BW, SC. Isoflurane (Aerrane; Janssen Animal Health, Toronto, Ontario) was used for induction and maintenance of anesthesia. The cat was surgically prepared in a routine fashion, and the right kidney and associated cyst were removed, immersed in 10% buffered formalin, and submitted to a veterinary diagnostic laboratory (Animal Health Laboratory, University of Guelph, Guelph, Ontario) for histologic examination.

Postoperative pain was managed with butorphanol, 0.3 mg/kg BW, SC. Despite attempts at resuscitation, the cat died 8 h postoperatively. The owner declined a postmortem examination. Histologic examination of the affected kidney revealed no grossly recognizable renal tissue. A large 2-cm cystic structure with a thick wall was found adjacent to a 1×5 -cm triangular mass of firm white tissue. The cystic tissue was dense fibrous connective tissue with many small, duct-like acinar structures embedded within it. The composition of the triangular mass was similar, but it was bordered by abundant adipose tissue with diffuse interstitial fibrosis. Histologically, the differential diagnosis was congenital renal cyst or scirrhous adenocarcinoma.

Retinopathy is a common finding in hypertensive cats with concurrent renal failure or hyperthyroidism (1–4). In one study, 100% of 24 cats with systemic hypertension had hypertensive retinopathy, and 83.3% of these cats were presented for acute onset of blindness (2). Hypertensive retinopathy occurs most frequently in geriatric cats, aged 12 to 15 y (1,3,5). On ophthalmoscopic examination, there is usually bilateral intraocular hemorrhage; retinal edema and detachment; development of inner retinal ischemic spots (“cotton-wool”); and vessel tortuosity, accompanied by localized or generalized narrowing of retinal arterioles (6,7).

Hypertension in felids is often secondary to chronic renal disease or hyperthyroidism (1). In this case, the cause was attributed to chronic renal failure induced by obstruction of the ureter by an intraneuphric cyst. Common sequela to systemic hypertension in cats include ophthalmic, renal, cardiovascular, and cerebrovascular damage (1). Clinical signs of hypertension reflect the organ affected; they include blindness, polyuria, polydipsia, hematuria, weight loss, dyspnea, exercise intolerance, depression, seizures, and epistaxis (1,2). In this case, no cardiovascular or cerebrovascular abnormalities were detected, but ophthalmic and renal abnormalities were evidenced by blindness, polyuria, polydipsia, weight loss, and lethargy. It should be noted that

although this cat's urine specific gravity was 1.048, cats may develop primary renal azotemia while concentrating their urine beyond 1.040 (1–3,8).

Cats > 8 y of age with chronic renal failure or hyperthyroidism are at risk of developing hypertension and should have routine fundic examinations, systolic blood pressure readings, and thoracic radiographs to detect early ophthalmologic, systemic, and cardiovascular changes. Although no cardiovascular enlargement was detected in this case, hypertension is a frequent cause of left ventricular hypertrophy in cats (9). Echocardiography may show hypertrophy of the ventricular septum, left atrial enlargement, and an abnormal mitral inflow pattern, while electrocardiography may reveal intraventricular conduction blocks and ventricular arrhythmia (10). Other cardiac findings may include mild systolic murmurs (2).

Consecutive systolic blood pressure readings > 170 mm Hg are diagnostic of systemic hypertension in cats, and indicate the need for antihypertensive therapy (1,9). A low-sodium diet is advisable to counteract the tendency of the kidneys to retain sodium, which may exacerbate hypertension (1). Long-acting dihydropyridine calcium antagonists, such as amlodipine besylate (Istin or Norvasc; Pfizer, New York, New York, USA), 0.625 mg (one eighth of a 5-mg tablet), PO, q24h, achieve normotension in hypertensive cats (1,4,5,10) by dropping blood pressure by an average of 49 mm Hg (10). Angiotensin-converting enzyme inhibitors or beta-blockers may also be used in conjunction with amlodipine to return the cat to a normotensive state (1,2). Diuretics may help to lower systemic blood pressure, but they should be used with caution in cats with renal compromise, as they may exacerbate existing hypokalemia (1). In addition to receiving amlodipine, patients with hypertension and concomitant renal failure benefit from treatment with aluminum hydroxide, while hyperthyroidism responds well to methimazole (9).

In one study (10), mean survival time of cats on antihypertensive therapy was 203 d (range, 19 to 993 d),

although cats with serious retinal detachment remained blind. In cats with subtle fundic changes, including retinal detachment, early detection and treatment may result in retinal reattachment and restoration of vision (5). The case reported here was unusual because hypertension was induced by obstruction of the ureter by an intraneuric cyst. Had blood pressure readings been taken with the first signs of chronic renal failure, the hypertensive retinopathy and resulting blindness might have resolved with treatment.

Acknowledgments

The author thanks Drs. Jody Molder, Nancy Silverberg, and Harry Morrison for their support on this case. I also thank Dr. Joseph Wolfer for encouragement and suggestions regarding this report.

CVJ

References

1. Henik RA. Diagnosis and treatment of feline systemic hypertension. *Compend Contin Educ Pract Vet* 1997;19:163–177.
2. Littman MP. Spontaneous systemic hypertension in 24 cats. *J Vet Intern Med* 1994;8:79–86.
3. Stiles J, Polzin DJ, Bistner DJ. The prevalence of retinopathy in cats with systemic hypertension and chronic renal failure or hyperthyroidism. *J Am Anim Hosp* 1994;30:564–572.
4. Wolfer J, Grahn BH, Arrington K. Diagnostic Ophthalmology. *Can Vet J* 1997;38:519–520.
5. Barnett KC, Crispin SM. Feline Ophthalmology — An Atlas and Text. London: WB Saunders, 1998:155–159.
6. Peiffer RL, Peteren-Jones SM. Small Animal Ophthalmology: A Problem-Oriented Approach. 2nd ed. London: WB Saunders, 1997:123–125.
7. Crispin SM, Mould JRB. Systemic hypertensive disease and the feline fundus. *Vet Ophthalmol* 2001;4:131–140.
8. Adams LG, Polzin DJ, Osborne CA, O'Brien RD. Effects of dietary protein and calorie restriction in clinically normal cats and in cats with surgically induced chronic renal failure. *Am J Vet Res* 1993;54:1653–1662.
9. Bright JM, Mears E. Chronic heart disease and its management. *Vet Clin North Am Small Anim Pract* 1997;27:1305–1317.
10. Elliot J, Barber PJ, Syme LIM, Rawlings IM, Markwell PJ. Feline hypertension: clinical findings and response to antihypertensive treatment in 30 cases. *J Small Anim Pract* 2001;42:122–129.

www.canadianveterinarians.net

Tables of contents

Tables des matières

Coming events

Événements à venir

Article abstracts

Résumés d'articles

Classified advertising

Annonces classées

Subscription information

Information sur l'abonnement

Instructions for authors

Directives à l'intention des auteurs

www.veternaiaresaucaanada.net